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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Shin-ichi Uehara

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

CHANG, AUDREY Y

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/782,928	Applicant(s) UEHARA ET AL.	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 11-15 and 25-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11-15, and 25-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on January 14, 2008, which has been entered into the file.
- By this amendment, the applicant has amended claims 1-2,14-15, 25-28 and has newly added claims 30-31.
- Claims 1-5, 11-15 and 25-31 remain pending in this application.
- The objections to figures set forth in the previous Office Action are withdrawn in response to applicant's amendment.

Claim Objections

1. Claims 25-31 are objected to because of the following informalities:

(1). The equations recited in claims 25-28 are confusing and indefinite since the claims fail to provide the physical meaning for " $\tan(1')$ " that makes the equation indefinite and arbitrary. The meaning of this expression must be *explicitly* stated in the claims to make the scopes of the claims clear. At this juncture this expression is open for interpretation as one sees fit.

(2). The newly added claim 29 recites the phrase "to prevent a lack of feature points" that is confusing since it is not clear what is considered to be these feature points.

The applicant is respectfully reminded, indeed that " $\tan(1')$ " is a numerical number, so that there has to be physical meaning for this pure numerical value to be introduced into the "number of pixels per inch". Since "number of pixels per inch" has physical meaning relates to the resolution of sight so the pure numerical expression has to have physical meaning to be able to contribute to this physical expression.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 3, 11-13, 14, 25, and 27 and newly added claims 29-30 are rejected under 35**

U.S.C. 103(a) as being unpatentable over the patent issued to Ichinose et al (PN. 4,987,487).

Ichinose et al teaches a stereoscopic or *three-dimensional image display device* that is comprised of a *display panel* (51, Figures 8-9 or 100 Figures 10-11) wherein a plurality of pixels sections including pixels displaying an image for right eyes and pixels displaying an image for left eye arranged in matrix form and periodically arranged in horizontal direction, (51-a1, 51-b1 etc. in Figures 8-9 or LLRR in Figures 10-11). The image display device further comprises a *lenticular lens*, serves as the *optical unit* that directs light emitted from the pixels displaying said image. It is implicitly true that a three-dimensional or stereoscopic visible region is *inherently* defined by placing the midpoint between a viewer's right and left eyes in the visible range such that the image light emitted from the pixels for displaying the right image will incident to the right eye of the observer and the image light emitted from the pixels for display the left image will incident to the left eye of the observer, (please see Figure 9 illustrates the visible range for the three-dimensional viewing). **Ichinose et al** teaches that the normal distance between the midpoint of the *eyes* to the *lenticular lens* or the optical unit is D and the distance between the *display panel* and the optical unit is f' (i.e. the focal length of the lenticular length). The actual distance between the midpoint of the eyes and the display panel therefore equals $D'' = D + f'$. It is also implicitly true that there is a **most** distant point with distance D' between the midpoint of the eyes

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and the display panel within the three-dimensional visible region for allowing the stereoscopic image to be viewable by the observer.

As demonstrated by Figure 8, the *smallest* separation between two adjacent image pixel sections that can be *resolved* by the eyes so that one image from the first pixel section to be directed to left eye and the other image from the adjacent second pixel section to the right eye is indicated in Figure 8 as L . **And the definition of the pixel section is defined as $1/L$.** From simple geometry one can calculate the definition of the pixel section as the following:

Assuming the *angular separation* between the image lights from the two adjacent pixel sections is a and the angular separation of the image light after passing through the optical unit or lenticular lens is b . Then the following condition can be established:

$L/f = \tan(a)$ and $e/D = \tan(b)$. “ e ” being the separation distance between two eyes and D is the observation distance.

The actual distance between the midpoint of the two eyes and the display panel (D') and the actual distance between the **most** distant point in the three dimensional visible range and the display panel (D'') are defined as follows:

$$D' = D + f' \quad \text{and} \quad D'' > D'.$$

One can then get the following conditions:

$L + e = (f' * \tan(a)) + (D * \tan(b))$, for paraxial light, $b=a$, and $\tan(a)$ approximately equals to a in radians and $\tan(b)$ approximately equals to b in radians. And if the optical unit is a *parallax barrier* with slits instead of the lenticular lens, the angle a will be equal to angle b . This means the following:

$(L + e)$ approximately equals $(f' + D) * \tan(a)$, which then equals to $D'' * \tan(a)$. This means

$L < D'' * \tan(a)$, or $1/L > 1/(D'' * \tan(a))$, with the conversion factor between millimeter to inch (i.e. 25.4 millimeter per inch), **$1/L > 25.4/(D'' * \tan(a))$ (dpi).** Similarly $L < D' * \tan(a)$, (i.e. distance

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measured from display panel to the **most** distant point in the visible range), and

$$1/L > 25.4/(D' \cdot \tan(a))(\text{dpi}).$$

This means $1/L > 25.4/(\text{DIS} \cdot \tan(a))(\text{dpi})$. By setting the distance in the normal direction of the observer to the display panel to be **DIS, wherein DIS is between D' and D'' or is the most distance D'**. The **definition** of the pixel section ($1/L$) therefore is defined with respect to the angular separation of the image light from the adjacent pixel section. This reference however does not teach explicitly to have the definition to satisfy the cited equation " $X > 25.4/(D \cdot \tan(1'))$ ". The claims however also do not teach the meaning of " $\tan(1')$ ", it can only be examined in the broadest interpretation. It is known in the art that **general eyesight** is 1.0, which means the minimum angular separation, is 1/60 degree or one minute. This means the **definition** is $1/L > 25.4/(D' \cdot \tan(1'))(\text{dpi})$.

Claims 1 and 14 have been amended to include the phrase that *"a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible rang"*. This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing his eyes within the three-dimensional visible range. The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed. Furthermore, as explicitly stated about the definition of the display has expression $1/L > 25.4/(D' \cdot \tan(1'))(\text{dpi})$. This means the number of the pixels per inch is no less than the resolution of the eyesight.

With regard to claim 3, Ichinose et al teaches that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 11,, Ichinose et al teaches the image display device is intended for displaying three-dimensional images taken from photographs and being processed by a computer, (please

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see 3). However it does not specify that it is movie picture. But the application of such display apparatus to display movie pictures would have been obvious to one skilled in the art since it involves only feed in movie pictures to the computer for processing, and such modification has the advantage of displaying three dimensional movie pictures.

With regard to claims 12-13, this reference also does not teach explicitly that the display apparatus is applied to different portable devices. However since Ichinose et al does teach that the display device includes liquid crystal display and it is known in the art that liquid crystal display device is widely applied in many portable visual devices, such modifications would have been obvious to one skilled in the art to allow this stereoscopic image display device be applied in different *portable* device for providing portable 3D views. It also has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Madham, 2 USPQ2d 1647 (1987).

With regard to newly added claim 29, Ichinose et al implicitly teaches that the resolution of the image pixels (i.e. number pixels per inch) is greater than the resolution of the eyesight then it is implicitly true that such requirement will prevent “a lack of feature points” the same way as the instant application.

With regard to claim 30, Ichinose et al teaches these equations or relationships explicitly. As illustrated in Figures 9 and 10, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β . Then the following condition can be established:

$L/f = L/H = \tan(\alpha)$ and $e/D = \tan(\beta)$, $n \times \sin(\alpha) = \sin(\beta)$. “2L” being the pitch of a pixel section, “e” being the separation distance between two eyes, f being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the lenticular lens can be attached next to the pixel section as shown in

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Figure 10, such that the Snell's law satisfies, $n \times \sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

4. **Claims 2, 4, and 15, 26, 28 and newly added claim 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ichinose et al as applied to claims 1 and 14 above, and further in view of the patent issued to Isono et al (PN. 5,315,377).**

The method and apparatus for outputting image for stereoscopic vision taught by **Ichinose et al** as described for claims 1, and 14 above has met all the limitations of the claims. With regard to claims 2 and 15, this reference does not teach explicitly about the definition of the pixel section in vertical direction of the pixels matrix. With regard to claim 4, this reference also does not teach explicitly that the optical unit can be parallax barriers with a plurality of slits. **Isono et al** in the same field of endeavor teach a three-dimensional image display wherein a *parallax barrier* having a plurality of slits (Figures 2, 4 and 8A), that is aligned with the matrix arrangement of the pixels (Figures 8B and 9) is used to provide the three-dimensional image display. It is implicitly true for square or rectangular type of pixel section, the **same definition analysis disclosed above** also applies for the **vertical** direction of the matrix to allow the image being resolved by the eyes of the observer to achieve stereoscopic viewing. It would then have been obvious to one skilled in the art to apply the teachings of Isono et al to modify the display apparatus of **Ichinose et al** to use parallax barrier, an electronic one as disclosed by Isono et al, as alternative means to achieve the stereoscopic image display for the benefit of allowing different design and control, (the electronic driven parallax barrier has the advantage of controlling the slit size), that suited for different application to achieve the stereoscopic image viewing.

Claim 2 has been amended to include the phrase that “a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as

projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible range". This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing his eyes within the three-dimensional visible range. The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed. Furthermore, as explicitly stated about the definition of the display has expression $1/L > 25.4/(D' \cdot \tan(1'))(\text{dpi})$. This means the number of the pixels per inch is no less than the resolution of the eyesight.

With regard to claim 31, Ichinose et al teaches these equations or relationships explicitly. As illustrated in Figures 9 and 10, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β . Then the following condition can be established:

$L/f = L/H = \tan(\alpha)$ and $e/D = \tan(\beta)$, $n \times \sin(\alpha) = \sin(\beta)$. "2L" being the pitch of a pixel section, "e" being the separation distance between two eyes, f being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as D-H, in the claim). It is noted that the lenticular lens can be attached next to the pixel section as shown in Figure 10, such that the Snell's law satisfies, $n \times \sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ichinose et al as applied to claim 1 above, and further in view of the patent issued to Chikazawa (PN. 5,852,512).

The method and apparatus for outputting image for stereoscopic vision taught by **Ichinose et al** as described for claim 1, above have met all the limitations of the claims. Ichinose et al teaches the optical unit is a *lenticular* lens having a plurality of cylindrical lenses. However it does not teach explicitly that the cylindrical lenses are arranged periodically in the horizontal direction and extended in

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the vertical direction. But it is true that the lenticular lenses of Ichinose et al are arranged periodically in the horizontal direction. And it is implicitly true that the lenticular lens is extended in a perpendicular direction with respect to the periodical direction as explicitly demonstrated by the teachings of **Chikazawa**. **Chikazawa** in the same field of endeavor teaches a lenticular lens having a plurality of cylindrical lenses that are arranged along the horizontal direction of the pixels and extended in the vertical direction. It would have been obvious to one skilled in the art to make the lenticular lens has this geometric arrangement for the benefit of providing horizontal parallax to allow stereoscopic vision.

6. Claims 1, 3, 11-14, 16, 25 and 27, and newly added claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Momochi (PN. 5,528,420) in view the patent issued to Ichinose et al (PN. 4,987,487).

Momochi teaches a *method* and *apparatus* for outputting image for stereoscopic vision wherein the apparatus comprises a display panel having a *plurality of pixels* forming pixel sections wherein the plurality of pixels displaying image for the right eye and image for the left eye respectively, and the pixels has a *matrix* form, (please see Figures 4 and 5) and are arranged periodically in horizontal direction. The apparatus further comprises an *optical unit*, such as a *lenticular lens*, for re-emitting image light from the display panel to *right eye and left eye of an observer*, respectively, (please see Figures 6-8). It is implicitly true that a three-dimensional or stereoscopic visible region is inherently defined by placing the midpoint between a viewer's right and left eyes in the visible range such that the image light emitted from the pixels for displaying the right image will incident to the right eye of the observer and the image light emitted from the pixels for display the left image will incident to the left eye of the observer. And it is implicitly true that there is a definite distance (D'), in the *normal direction* with respect to the display panel, between the *most* distant point in the three-dimensional visible range and the display panel and

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there is a definite distance (D''), in the normal direction with respect to the display panel, between the *midpoint* of the two eyes of the observer and the display panel.

As demonstrated by the Figure 7, the distance D'' , measured from the midpoint of the two eyes to the display panel, should equal to D (observation distance) *plus* ($n*f$). The symbol “ n ” means refractive index of the lenticular lens and “ f ” means the focal length of the lens. The *smallest* separation between two adjacent image pixel sections that can be *resolved* by the eyes so that one image from the first pixel section to be directed to left eye and the other image from the adjacent second pixel section to the right eye is indicated in Figure 7 as Δ . And the definition of the pixel section is defined as $1/\Delta$. From simple geometry one can calculate the definition of the pixel section as the following:

Assuming the *angular separation* between the image lights from the two adjacent pixel sections is a and the angular separation of the image light after passing through the optical unit or lenticular lens is b . Then the following condition can be established:

$\Delta/n*f = \tan(a)$ and $W/D = \tan(b)$. W being the separation distance between two eyes and D is the observation distance.

The actual distance between the midpoint of the two eyes and the display panel (D'') and the actual distance between the most distant point in the three dimensional visible range and the display panel (D') are defined as follows:

$$D'' = D + n*f \text{ and } D' > D''.$$

One can then get the following conditions:

$\Delta + W = (n*f) \tan(a) + D \tan(b)$, for paraxial light, $b = n*a$, and $\tan(a)$ approximately equals to a in radians and $\tan(b)$ approximately equals to b in radians. And if the optical unit is a *parallax barrier* with slits instead of the lenticular lens, the angle a will be equal to angle b . This means the following:

$$\Delta + W \text{ approximately equals } (n*f + D) * \tan(a), \text{ which then equals to } D'' * \tan(a). \text{ This means}$$

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$\Delta < D'' * \tan(a)$, or $1/\Delta > 1/(D'' * \tan(a))$, with the conversion factor between millimeter to inch (i.e. 25.4 millimeter per inch), **$1/\Delta > 25.4/(D'' * \tan(a))$ (dpi)**. Similarly $\Delta < D' * \tan(a)$, (i.e. distance measured from display panel to the most distant point in the visible range), and **$1/\Delta > 25.4/(D' * \tan(a))$ (dpi)**.

This means **$1/\Delta > 25.4/(DIS * \tan(a))$ (dpi)**. By setting the distance in the normal direction of the observer to the display panel to be **DIS, wherein DIS is between D' and D'' or be at the most distant point D'**. The **definition** of the pixel section ($1/\Delta$) therefore is defined with respect to the angular separation of the image light from the adjacent pixel section. This reference however does not teach explicitly that the equation for definition is of the form recited in the claims. But the specification and claims also fail to give support and meaning for the claimed equation such feature can only be examined in the broadest interpretation. It is known in the art that a general eyesight is 1.0, which means the minimum angular separation, is 1/60 degree or one minute. This means the **definition is $1/\Delta > 25.4/(D'' * \tan(1'))$ (dpi), where the angle "a" is 1 minute.**

Claims 1 and 14 have been amended to include the phrase that *"a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible rang"*. This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing his eyes within the three-dimensional visible range. The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed. Furthermore, as explicitly stated about the definition of the display has expression **$1/L > 25.4/(D' * \tan(1'))$ (dpi)**. This means the number of the pixels per inch is no less than the resolution of the eyesight.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the pixels of the display device emits the image light. It is known in the art that the geometric relationship between the definition in term of the viewing distance of the observer does not change by whether the fact that the image pixels actually emit the light themselves or the image light reflected from them since the definition is defined by the geometric relationship set forth in above, (the applicant is noted no where in the mathematical deduction above does the fact of the origin of the image light come in to become a determining factor). Furthermore, it is well known in the art to use display device such as liquid crystal display device to provide the display panel having plurality of pixels sections and optical unit that emits the image light emitted from the liquid crystal display device to provide the stereoscopic image display as demonstrated by **Ichinose et al.** **Ichinose et al** teaches explicitly about same geometric relationship between the image definition and the observation viewing distance, (please see Figures 8-9). It would then have been obvious to one skilled in the art to apply the teachings of Ichinose et al to use liquid crystal display device as the display panel for the benefit of allowing the stereoscopic image display arrangement of Momochi be applied to a variety of display device utilizing liquid crystal display device such as television, video game device or computer. With regard to claim 3, Ichinose et al teaches explicitly that the display device having this display panel could be a liquid crystal display device, (please see column 2, line 5 or column 5, lines 38-40).

With regard to claim 11,, Momochi teaches the image display device is intended for displaying three-dimensional images taken from photographs and being processed by a computer, (please see 3). However it does not specify that it is movie picture. But the application of such display apparatus to display movie pictures would have been obvious to one skilled in the art since it involves only feed in movie pictures to the computer for processing, and such modification has the advantage of displaying three dimensional movie pictures.

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With regard to claims 12-13, this reference also does not teach explicitly that the display apparatus is applied to different portable devices. However it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Madham*, 2 USPQ2d 1647 (1987).

With regard to newly added claim 29, Momochi et al implicitly teaches that the resolution of the image pixels (i.e. number pixels per inch) is greater than the resolution of the eyesight then it is implicitly true that such requirement will prevent “a lack of feature points” the same way as the instant application.

With regard to newly added claim 30, Momochi et al teaches these equations or relationships explicitly. As illustrated in Figure 6, the *angular separation* between the image lights from the two adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β . Then the following condition can be established:

$\Delta/nf = \Delta/H = \tan(\alpha)$ and $W/D = \tan(\beta)$, $n \times \sin(\alpha) = \sin(\beta)$. “ 2Δ ” being the pitch of a pixel section, “ W ” being the separation distance between two eyes, (i.e. the same as “ e ”), nf being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as $D-H$, in the claim). It is noted that the Snell’s law satisfies, $n \times \sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

7. **Claims 2, 4, 7, 15, 26, 28 and newly added claim 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi and Ichinose et al as applied to claims 1 and 14 above, and further in view of the patent issued to Isono et al (PN. 5,315,377).**

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi in view of the teachings of Ichinose et al** as described for claims 1 and 14, above have met all the limitations of the claims. With regard to claims 2 and 15, this reference does not teach explicitly about

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the definition of the pixel section in a second direction of the pixels matrix. With regard to claim 4, this reference also does not teach explicitly that the optical unit can be a parallax barriers with a plurality of slits. **Isono** et al in the same field of endeavor teach a three-dimensional image display wherein a *parallax barrier* having a plurality of slits (Figures 2, 4 and 8A), that is aligned with the matrix arrangement of the pixels (Figures 8B and 9) is used to provide the three-dimensional image display. It is implicitly true for square or rectangular type of pixel section, *the same definition analysis* disclosed above also applies for the vertical direction of the matrix to allow the image being resolved by the eyes of the observer to achieve stereoscopic viewing. It would then have been obvious to one skilled in the art to apply the teachings of Isono et al to modify the display apparatus of Momochi to use parallax barrier, an electronic one as disclosed by Isono et al, as alternative means to achieve the stereoscopic image display for the benefit of allowing different design and control, (the electronic driven parallax barrier has the advantage of controlling the slit size), that suited for different application to achieve the stereoscopic image viewing.

Claim 2 has been amended to include the phrase that “*a number of pixels sections per inch in the horizontal direction is configured such that a resolution of the image in the horizontal direction as projected in the three-dimensional visible range is no less than the resolution by the eyesight of a viewer whose midpoint between the right eye and the left eye is positioned in the three-dimensional visible rang*”. This feature is **implicitly** met since the three-dimensional image is observed by the observer when the observer placing his eyes within the three-dimensional visible range. The pixel definition (i.e. pixel per inch), has to be greater than resolution of the eyesight in order for the image to be able to be viewed. Furthermore, as explicitly stated about the definition of the display has expression $1/L > 25.4/(D' \cdot \tan(1'))(\text{dpi})$. This means the number of the pixels per inch is no less than the resolution of the eyesight.

With regard to newly added claim 31, Momochi et al teaches these equations or relationships explicitly. As illustrated in Figure 6, the *angular separation* between the image lights from the two

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adjacent pixel sections is α and the angular separation of the image light after passing through the optical unit or lenticular lens is β . Then the following condition can be established:

$\Delta/nf = \Delta/H = \tan(\alpha)$ and $W/D = \tan(\beta)$, $n \times \sin(\alpha) = \sin(\beta)$. “ 2Δ ” being the pitch of a pixel section, “ W ” being the separation distance between two eyes, (i.e. the same as “ e ”), nf being the distance between the lenticular and the pixel section (i.e. same as H), and D is the distance between the lenticular lens and the eyes, (i.e. same as $D-H$, in the claim). It is noted that the Snell’s law satisfies, $n \times \sin(\alpha) = \sin(\beta)$, with n being refractive index of the lenticular lens.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi and Ichinose et al as applied to claim 1 above, and further in view of the patent issued to Chikazawa (PN. 5,852,512).

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi in view of the teachings of Ichinose et al** as described for claim 1 above have met all the limitations of the claims. Momochi teaches the optical unit is a *lenticular* lens having a plurality of cylindrical lenses. However it does not teach explicitly that the cylindrical lenses are arranged periodically in the horizontal direction and extended in the vertical direction. But it is true that the lenticular lens of Momochi are arranged periodically in the horizontal direction. And it is implicitly true that the lenticular lens is extended in a perpendicular direction with respect to the periodical direction as explicitly demonstrated by the teachings of **Chikazawa**. **Chikazawa** in the same field of endeavor teaches a lenticular lens having a plurality of cylindrical lenses that are arranged along the horizontal direction of the pixels and extended in the vertical direction. It would have been obvious to one skilled in the art to make the lenticular lens has this geometric arrangement for the benefit of providing horizontal parallax to allow stereoscopic vision.

Response to Arguments

9. Applicant's arguments filed on January 14, 2008 have been fully considered but they are not persuasive. The newly amended claims and newly added claims have been fully considered and rejected for the reasons stated above.

10. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The applicant in particular argues the examiner fails to "articulate any rationale for modifying the definition of a three dimensional image based on the resolution of the eyesight of viewer", in considering the reasons of rejections based on cited Ichinose et al and Momochi references, the examiner respectfully disagrees. One skilled in the art or any ordinary person would understand that in order for the images provided by the pixels to be viewed by an observer with normal eyesight, the smallest separation of the pixels which is referred to be definition of the display, has to be greater than normal eyesight of human being. In fact, a general eyesight for a normal human being is 1.0, which means the minimum angular separation, is 1/60 degree or one minute. This is the limitation of the structure of human eyeball. So to make the definition greater than the normal eyesight of a human being is not irrational and is not hindsight since if such condition is not met then the image displayed by the display device cannot be viewed by an observer. Since the human eye cannot resolve the image.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.
/Audrey Y. Chang/
Primary Examiner, Art Unit 2872